

HONOLULU
LA JOLLA
MONTEREY
TIBURON



SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - MARCH 1982

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* Editor, Southwest Fisheries Center *
* P. O. Box 271 *
* La Jolla, California 92038 *
*
* IZADORE BARRETT, Center Director *
* JOHN F. CARR, Deputy Director *
* LILLIAN VLYMEN and *
* SHARI SITKO, Editors *

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HONOLULU LABORATORY

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TIBURON LABORATORY

PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - MARCH 1982

STATUS OF PUBLICATIONS

Published

Ahlstrom, E. H. and H. G. Moser. 1981. Systematics and development of early life history stages of marine fishes: Achievements during the past century, present status and suggestions for the future. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 541-546.

Alvarino, Angeles. 1981. The relation between the distribution of zooplankton predators and anchovy larvae. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 197-199.

Eldridge, Maxwell B., Jeannette Whipple, and Dana Eng. 1981. Endogenous energy sources as factors affecting mortality and development in striped bass (*Morone saxatilis*) eggs and larvae. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 568-570.

Hewitt, Roger. 1981. The value of pattern in the distribution of young fish. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 229-236.

Hunter, John R. and Carol Kimbrell. 1981. Some aspects of the life history of laboratory-reared Pacific mackerel larvae (*Scomber japonicus*). Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 344.

Lasker, Reuben. 1981. Factors contributing to variable recruitment of the northern anchovy (*Engraulis mordax*) in the California Current: Contrasting years, 1957 through 1978. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 375-388.

Studies on the distribution of first-feeding larval anchovy and their food were made to test the hypothesis that the upper mixed

layer of the ocean must be in a stable (non-turbulent) state for survival of enough larval anchovy to insure the production of a good year-class. Turbulent conditions destroy food aggregations and dilute potential food organisms to below feeding threshold concentrations of first-feeding larval anchovies. Surveys during the anchovy spawning season of 1975, 1976, and 1978 provided data supporting this hypothesis. Food of first-feeding larval anchovies became limiting when storms (1978) or drastic upwelling (1975) occurred which diluted food aggregations. A complicating factor was that nutritionally inadequate larval fish food could be occasionally overwhelmingly dominant in the larva's environment (1975). The drought year (1976) was characterized by stable conditions in the Southern California Bight and produced one of the best of the last 16 anchovy year-classes; 1975 produced one of the worst. Partial success of the anchovy year-class in 1978 is predicted based on the onset of stable conditions and food aggregations in the latter part of the spawning season.

Lasker, R. and K. Sherman. 1981. Physiological ecology. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 297-298.

Methot, Richard D., Jr. 1981. Spatial covariation of daily growth rates of larval northern anchovy, Engraulis mordax, and northern lampfish, Stenobranchius leucopsarus. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 424-431.

The widths of the outer three daily growth increments in the otoliths of larval Engraulis mordax (Engraulidae) and Stenobranchius leucopsarus (Myctophidae) were used as a measure of recent growth rate. From 10 samples collected off the coast of Oregon, 367 E. mordax and 141 S. leucopsarus individuals were analyzed. The overall mean growth rate of S. leucopsarus increased from 0.11 mm per day at a length of 5 mm to 0.28 mm per day at 15 mm. For E. mordax, growth rate declined from 0.57 per day at 5 mm to 0.41 mm per day at 15 mm. Within- and between-sample variance in growth rate was small, no spatial trends were detected. Correlations between E. mordax growth rate and S. leucopsarus growth rate among the 10 samples were not significant.

Moffatt, Nancy M. 1981. Survival and growth of northern anchovy larvae on low zooplankton densities as affected by the presence of a Chlorella bloom. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 475-480.

First feeding northern anchovy, Engraulis mordax, were reared on low densities (100, 150 and 300 items/l) of wild zooplankton in a medium containing 10,000 to 19,000 cells/ml of the green alga Chlorella. After 16 days, mean survival was five times greater than, and growth equivalent to, that usually sustained in the laboratory at much higher food densities.

Feeding experiments, coupled with larval and dietary fluorescence measurements, showed that larvae not only ingest the small Chlorella cells, but are capable of substantial intestinal degradation of the algal cell wall and intracellular chlorophyll. Thus anchovy larvae potentially derive direct nutritional benefit from the algal cells. It was also shown that these larvae can derive indirect nutritional benefit from the algal cells present in the guts of well-fed zooplankton ingested by the larvae.

Therefore, it appears that northern anchovy larvae are capable of significant survival and growth at low zooplankton densities in the presence of dense algal blooms, because the larval diet is supplemented both directly and indirectly by algal nutrients.

O'Connell, Charles. 1981. Estimation by histological methods of the percent of starving larvae of northern anchovy (Engraulis mordax) in the sea. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 357-360.

Owen, R. W. 1981. Microscale plankton patchiness in the larval anchovy environment. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 364-368.

Perry, A., G. B. Bauer, and A. E. Dizon. 1981. Magnetite in the green turtle. EOS; Trans., Am. Geophys. Union 62(45): 850 [abstract only]. GPA4-2-6.

Migratory green sea turtles, Chelonia mydas, can accurately navigate in the open ocean over distances of several hundreds to a few thousands of kilometers. Numerous guidance mechanisms for their feeding to breeding site journeys have been postulated, but few have been examined experimentally. Preliminary data suggests [sic] one navigational cue may be the ability of the green turtle to detect the geomagnetic field.

The discovery of biogenic magnetite in other marine species stimulated our interest in looking for magnetite in Chelonia. Employing the SQUID magnetometer of the Hawaii Institute of Geophysics, five hatchling and juvenile turtle specimens and one adult were tested. Saturation induced magnetic remanence one to two orders of magnitude greater than background noise was found in the heads of all turtles examined, and was localized to the dura tissue in the adult. The samples were subsequently subjected to AF demagnetization.

Dura tissue from six juveniles was then digested with hypochlorite. The residue was examined microscopically and numerous opaque, needle-shaped magnetic particles were removed. These were tested via mineralogical techniques in order to determine if magnetite was the source of the remanence previously

found. Behavioral studies are ongoing in an attempt to conclusively demonstrate magnetic sensitivity in the green turtle.

Sherman, K. and R. Lasker. 1981. Symposium on the early life history of fish: Introduction and background. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: iii-vi.

Smith, Paul E. 1981. Time series of anchovy larva and juvenile abundance. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 201.

Smith, Paul E., Larry E. Eber, and James R. Zweifel. 1981. Large-scale environmental events associated with changes in the mortality rate of the larval northern anchovy. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 200.

Theilacker, Gail H. 1981. Effect of feeding history and egg size on the morphology of jack mackerel, *Trachurus symmetricus*, larvae. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 432-440.

Walker, M. M., and A. E. Dizon. 1981. Identification of magnetite in tuna. EOS; Trans., Am. Geophys. Union 62(45): 850 [abstract only]. GPA4-2-5.

Highly migratory animals such as the tuna should find the ability to detect the geomagnetic field very useful in navigation. Recent discoveries of biogenic magnetite in a variety of species led us to search for magnetite in the yellowfin tuna, *Thunnus albacares*. We tested representative tissues and organs from seven juvenile yellowfin tuna for saturation induced magnetic remanence in the SQUID magnetometer at the University of Hawaii Institute of Geophysics. Tissue samples with signal to noise ratios greater than unity were weighed to calculate magnetic intensity and subjected to AF demagnetization.

High sIRM and magnetic intensity values were consistently obtained only for tissues from within the ethmoid bone complex of the skull of the yellowfin tuna. AF demagnetization experiments on frozen tissue samples from the ethmoid bone complex suggested that the sIRM of the tissue is carried by ferromagnetic crystals with coercivities between 9 and 10 milliTesla. An X-ray diffraction pattern obtained from the residue after hypochlorite digestion of the magnetic tissue identified magnetite as the source of the remanence. Behavioral studies have demonstrated magnetic sensitivity in yellowfin tuna. Magnetite contained in the ethmoid bone complex may be the basis for magnetoreception in these fish.

Weihs, D. 1981. Swimming of yolk-sac larval anchovy (*Engraulis mordax*) as a respiratory mechanism. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 327.

Whipple, Jeannette, Maxwell Eldridge, Pete Benville, Michael Bowers, Brian Jarvis, and Nancy Stapp. 1981. The effect of inherent parental factors on gamete condition and viability in striped bass (Morone saxatilis). Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 93-94.

Zweifel, James R. and Paul E. Smith. 1981. Estimates of abundance and mortality of larval anchovies (1951-75): Application of a new method. Rapp. P.-v. Reun. Cons. int. Explor. Mer. 178: 248-259.

A method of analysis of egg and larval survey data based upon the maximum likelihood solution for the parameters of a modified negative binomial frequency model for the observed counts is described. The effect of uncontrollable variations in the real or "effective sampler size" and size-dependent levels of aggregation are incorporated as a fundamental part of the estimation procedure. Using this model, we calculated regional-seasonal estimates of abundance and mortality of northern anchovy larvae, Engraulis mordax, for the years 1951-75.

As a result of these analyses, we conclude that estimates of average catch, mortality and confidence intervals based upon semi-log regressions of the logarithm of the average standardized catch (rather than the logarithms of the individual observations) with time or age do not differ greatly from the estimates based upon the complete maximum likelihood solutions. Estimates of mean abundance and mortality generally coincided with estimates of the strength of a year-class obtained from fishery data. However, we were unable to consistently detect changes in recruitment using the parameters chosen for this study.

Equations are given for estimating the intensity of sampling required for a desired degree of precision in the relative coefficient of variation s_x/X . The methods described herein may be used for more sophisticated kinds of analyses to: (1) uncover hitherto unrecognized relationships among abundance, aggregation, coverage and mortality which may be indicative of changes in absolute or relative levels of recruitment; and (2) determine the most efficient allocation of effort in the field and laboratory.

Administrative Reports

Honolulu Laboratory

Hamm, David C. 1982. Preliminary description of the western Pacific fishery information network. SWFC Admin. Rep. H-82-2.

[U.S.] National Marine Fisheries Service. 1981. A plan for ciguatera research in the Pacific. SWFC Admin. Rep. H-81-11.

Approved by Center Director

Eber, Larry E. Computer program documentation, EDMAP2, Environmental
Data Mapping Program, version 2. For publication as NOAA-TM-NMFS-
SWFC-18.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Manuscripts Prepared and Data Analyzed from Northwestern Hawaiian Islands Fish Study

Richard N. Uchida, Leader of the Insular Ecosystem Study Task, reports that researchers in the Task continued analysis of data and preparation of manuscripts based on research cruises fielded during the recently completed 5-year field program in the Northwestern Hawaiian Islands (NWHI). Uchida completed two sections for the draft of the "Fishery atlas of the Northwestern Hawaiian Islands" which review the surface and tidal currents in the NWHI. He also completed revisions on the manuscript, "The seamount-groundfish trawl fishery in the central North Pacific Ocean," which he is co-authoring with research assistant Darryl T. Tagami.

James H. Uchiyama, Fishery Biologist, aided by Tagami, completed compilation of a species list for the "Fishery atlas of the Northwestern Hawaiian Islands." The list, extracted from catches made by trapping, trolling, handlining, and trawling, contains 40 species of crustaceans representing 23 families, 8 species of molluscs representing 6 families, and 273 species of fishes representing 80 families. From this species list, Uchiyama and Tagami will prepare tables of distribution by geographic area and by depth of capture. Size range and mean size will also be calculated for each species.

Uchiyama also completed calculation of the growth parameters for kahala, Seriola dumerili, based on daily ring counts on the sagittae. Using data collected from juveniles less than 4 cm in fork length (FL) and adults caught in waters of the NWHI, Uchiyama calculated the following growth parameters: $L = 149.4$ cm; $K = 0.31$; and $t_0 = 0.04$ year. Uchiyama received the juvenile kahala through the courtesy of King Burch of the Waikiki Aquarium. The largest kahala on record from waters of the NWHI is 149.0 cm FL.

Several manuscripts on the diet of various species of fishes are under preparation. Research assistant Michael P. Seki completed the first draft of a manuscript on the food and feeding habits of the grouper, Epinephelus quernus. Seki noted that in numbers, shrimps of the Family Pandalidae were found most frequently (constituting roughly 80% of all forage organisms) in the stomach contents of the grouper. He has also started preparation of another manuscript on the feeding habits of the pig-ulu, Pseudocaranx dentex (formerly Caranx cheilio). Research assistant Steven H. Kramer began writing portions of a manuscript on the food and feeding habits of the kahala; research assistant Robert L. Humphreys, Jr. is co-author of the manuscript. Kramer also completed analysis of data on the food habits of the ono, Acanthocybium solandri.

Research assistant Alan R. Everson continued his studies on the maturation and fecundity of several species of bottom fishes. Assisted by Tagami, Everson started analysis of fecundity data on ehu, Etelis carbunculus (formerly E. marshi), weighed and microscopically examined ovaries from onaga, E. coruscans (formerly E. carbunculus), and began gathering data and published information on gindai, Pristipomoides zonatus; kalekale, P. sieboldii; ehu; and onaga to prepare for writing a section on their biology and ecology for the NWHI fishery atlas.

Spiny Lobsters Measured for Size-at-Maturity Study

Research assistant James H. Prescott has measured carapace and leg lengths of 167 spiny lobster, Panulirus marginatus, caught in waters around Oahu for his study on the size-at-maturity of the species. Of these, 140 were caught nearshore aboard a fishing vessel and the remainder were caught during one day of diving at Kaena Point where many juvenile lobsters were found a year ago. Nearly the entire size range was sampled, but more importantly, the sizes at which lobsters begin to mature were well sampled. Data from 107 males and 108 females from Oahu are now in the size-at-maturity data base.

Prescott reanalyzed the data using the computer programs MATURE and LINFIT, as well as the "Morgan intersection method." The MATURE program was modified to output the arrays of cases classified by the program as mature or immature individuals. Linear regressions were then computed using SAS programs to provide statistics needed for testing differences in the slopes of the immature and mature growth phases of spiny lobsters.

Field Work Begins on RAIOMA Program

Dr. Jeffrey J. Polovina, Leader of the Resource Assessment Investigation of the Mariana Archipelago (RAIOMA) Program, reports that the NOAA research vessel, Townsend Cromwell, departed Honolulu on March 11 for Guam on a 6-month sojourn in the Mariana Archipelago. The Cromwell is expected to arrive in Guam on April 1 to begin the first RAIOMA cruise, a 16-day bathymetric and hydrographic cruise around Guam and Saipan. Chief Scientist on the cruise is research assistant Bert S. Kikkawa. En route to Guam the Cromwell will first proceed to the Northwestern Hawaiian Islands to provide logistic support for Honolulu Laboratory researchers who will be establishing field camps at Laysan and Lisianski Islands for Hawaiian monk seal research.

According to Polovina, the bathymetric and hydrographic cruise will be followed by a series of three biological cruises of approximately 40 days each, designed to assess the stocks of bottom fishes, shrimps, and neritic/pelagic species around all the islands in the Mariana Archipelago. In addition to researchers from the Honolulu Laboratory, personnel from the University of Guam Marine Laboratory and observers from the Division of Fish and Wildlife, Commonwealth of the Northern Mariana Islands, will participate in the biological cruises. Also, in order to acquaint the residents of Saipan and Guam with the RAIOMA program, open houses aboard the Cromwell will be held in Saipan on May 10 and in Guam on June 2.

Prior to departing for Guam, the Cromwell spent one day in Hawaiian waters for gear trials. Participating in the gear trials were personnel from the RAIOMA and Insular Ecosystem Study Tasks.

RAIOMA Field Station Established in Guam

Robert B. Moffitt, Fishery Biologist, departed Honolulu on March 4 to establish and manage the field station in Guam for the Resource Assessment Investigation of the Mariana Archipelago (RAIOMA) Program. Moffitt's primary duty in Guam will be to serve as liaison for the Honolulu Laboratory's RAIOMA program. Moffitt reports that during the month since he arrived in Guam, he has met with people at the University of Guam, Guam Division of Aquatic Resources, Sea Grant and Coastal Zone Management, and various fishermen to discuss RAIOMA and the current schedule for the R/V Townsend Cromwell's visit to the area. He has also begun assisting the University of Guam Marine Laboratory to establish their reference collection.

Progress Made on Tropical Biomass Ecosystem Model

This month Dr. Jeffrey Polovina, Mathematical Statistician, assisted by Edward J. Webman, Computer Technician, conducted sensitivity analyses of the Tropical Biomass Ecosystem Model. Input parameters were perturbed by 10, 15, 20, and 25%, and the magnitudes of the resulting changes in the estimated species biomasses were computed. The biomass estimates of the model are most sensitive to changes in annual instantaneous mortality and food efficiency. A perturbation in the annual instantaneous mortality for any one species group changes the estimated biomass of that group, on the average, by an amount slightly less than the magnitude of the perturbation. A perturbation of the food efficiency parameter for any one species group, on the other hand, results in a change in the estimated biomass for that group which is, on the average, 50% of the perturbation. For example, a 25% change in the annual instantaneous mortality for any one species group will change the biomass for that group by an average of 21% and change the total ecosystem biomass by 0.6%. A 25% change in the food efficiency for any one species group will change the estimated biomass of that species group by an average of 11% and the total ecosystem biomass by 9%. Based on these sensitivity analyses, users of the model will be able to assign rough confidence intervals to the biomass estimates for each species group based on the precision of the input parameter estimates.

FISHERY MANAGEMENT RESEARCH PROGRAM

Project Underway to Monitor the Marine Recreational Fishery in Hawaii

Fishery biologist Thomas S. Hida, who is in charge of a project to monitor the activities of the marine recreational fishing community in Hawaii, has designed a data log for recording catch, fishing effort, and operational details obtained from information published in the Hawaii Fishing News and from records maintained by sportfishing clubs. Hida has compiled a list of recreational fishing clubs and is now making contact with the clubs to obtain their records. He has gained access to the daily records of a charter fishing boat operated by a local fishing club. The records are extremely detailed and are now being coded for entry into the Honolulu Laboratory data management system.

Meeting of Fishery Economists Held at the Honolulu Laboratory

This month Samuel G. Pooley, Industry Economist, convened an informal meeting of fishery economists to discuss the exchange of economic data on central and western Pacific fisheries. Twenty-two economists and planners attended the meeting, including those from the University of Hawaii Sea Grant College Marine Advisory Program and the Departments of Agriculture and Economics; the Hawaii Division of Aquatic Resources; other State of Hawaii agencies and private enterprises; and the University of Guam. Discussions centered on research activities currently underway and priorities for future work.

Hawaii Landings of Skipjack Tuna Below Long-Term Average

The March 1982 Hawaii landings of skipjack tuna were estimated at 50 metric tons (MT), which is 48 MT below the March 1981 landings and 77 MT below the 1964-79 long-term average for March. The cumulative landings from January through March were estimated at 141 MT which is 32 MT below the 1981 landings for the same period and 252 MT below the 1964-79 long-term average for the same period.

PELAGIC RESOURCES INVESTIGATION

Mahimahi Spawning and Larval Rearing Experiments in Progress

Dr. Richard W. Brill, Leader of the Pelagic Ecosystem Study Task, reports that during the week of March 7-13, the mahimahi, Coryphaena hippurus, currently being maintained at the Honolulu Laboratory's Kewalo Research Facility (KRF) spawned repeatedly. The resulting fertilized eggs were divided among the Oceanic Institute, Waikiki Aquarium, and the KRF in order to simultaneously test egg/larvae viability and larval rearing conditions at each facility. To date, the Oceanic Institute has had a larval mortality of approximately 50%, which is by far the best of the three facilities involved in the study.

The experiment is a test of the larval fish culture systems and procedures that will eventually be used for tuna larvae. Mahimahi are being used for these initial experiments because they are much easier to raise in captivity than are tuna.

Tuna Olfaction Experiments Continue

Dr. Kim Holland, Hawaii Institute of Marine Biology, University of Hawaii, has been testing the reaction of yellowfin tuna, Thunnus albacares, to odors of opelu, squid, nehu, and other natural prey items. Under rigorous control of experimental conditions, Holland has been able to clearly demonstrate a hierarchy of prey odor stimulatory effectiveness, and to show a definite response to natural prey odors in naive fish. Both of these results have never been clearly obtained before.

The eventual goal of this work is the use of odors to enhance the effectiveness of floating fish aggregating devices and live bait fishing methods for tunas.

Progress Made in Developing Procedures to Analyze Length-Frequency Distributions

Dr. Jerry. A. Wetherall, Leader of the Stock Assessment Task, and Marian Y. Y. Yong, Mathematician, report progress in developing procedures for analyzing length-frequency distributions. They have completed the successful testing of a maximum likelihood procedure which permits the efficient separation of component year-class length-frequency distributions in multicohort samples. These procedures are now being extended to allow direct estimation of growth and mortality rates and year-class strength.

* * * * *

Fishery biologist Dr. Jerry Wetherall is editing the albacore otolith data received from Dr. Michael Laurs, Fishery Biologist at the Southwest Fisheries Center's La Jolla Laboratory, in preparation for an analysis of the tetracycline experiments which Laurs has conducted and an analysis of albacore age determinations made on small fish.

Cooperative Squid Research Cruise Report Completed

Walter M. Matsumoto, Fishery Biologist, has completed a draft of the cruise report on the second Honolulu Laboratory-Hokkaido University cooperative research cruise aboard the Hokkaido University's research and training vessel, Hokusei Maru. The cruise (cruise 82-01) was carried out during January-February 1982 in Hawaiian waters. The squid catches using the automatic jigging machines were considerably less than last year's catches. A total of 135 squids (27.6 kg) were taken on 14 fishing stations, as compared with 661 squids (120.22 kg) taken last year on 15 stations. The smaller catches were believed to be due to much rougher sea conditions this year.

* * * * *

Fishery biologist Walter Matsumoto has completed a report on the squid workshop which was held at the Honolulu Laboratory on February 16, 1982, and is continuing a literature survey for the DOMES project pertaining to the probable impact of deep seabed mining on fish larvae, especially larvae of tunas and billfishes.

Planning Underway for Cooperative Skipjack Spawning Research Project

Tamio Otsu, Chief of the Pelagic Resources Investigation, has received word from Dr. Teruo Harada of Kinki University, Wakayama Prefecture, Japan, that there is a possibility that Dr. Harada and an assistant could come to Hawaii in May or June to work on skipjack tuna spawning and larval rearing experiments in cooperation with researchers at the Honolulu Laboratory's Kewalo Research Facility. Dr. Harada is currently seeking funds from Kinki University to carry out this project. The cooperative project had been proposed earlier by Richard S. Shomura, Honolulu Laboratory Director, during Dr. Harada's visit to Honolulu about one year ago.

* * * * *

Fishery biologist Tamio Otsu reports that he has received a positive response from Takashi Sasaki, Groundfish Investigations, Far Seas Fisheries Research Laboratory (FSFRL), on a request for seamount resources data,

particularly data from the Japanese commercial fishery. Whatever data are available at the FSFRL on this fishery will be sent to the Honolulu Laboratory.

* * * * *

Bob Neuweiler, a local commercial fisherman, visited Tamio Otsu to discuss research by Japan Marine Resources Research Center (JAMARC) on sharks and pomfrets in the North Pacific. Neuweiler mentioned that he had read an article on JAMARC's survey in the newspaper, West Hawaii Today, which was based on information given in the Monthly Narrative Report of the Honolulu Laboratory.

DATA MANAGEMENT AND TECHNICAL SERVICES

Documentation of Secondary Tuna Catch and Efforts Files Completed

Mark A. Scheele, Computer Programmer, has completed the development and documentation of a series of secondary tuna catch and effort files with a common or standardized record format. This standardized format was developed earlier this year during a series of meetings and discussions between tuna data users and the Data Management and Technical staff, and provides adequate control and identification information to allow general purpose summarization or analytical software to be written and applied to all tuna catch and effort data without modification. In addition, use of the control and identification information has been facilitated by a small library of subroutines and functions to simplify decoding, unit conversion, and labeling of output. This series of files, which presently encompasses only the more frequently used data, will be expanded to cover most of the tuna data after an initial trial and evaluation period.

Progress Made in Developing Data Management System for RAIOMA Program

Ronald C. Antinoja, Computer Technician, continues to make progress on the data entry and management system for the RAIOMA (Resource Assessment Investigation of the Mariana Archipelago) survey data. Prototype systems, including documentation for data entry, verification, and validation based on shrimp trap report forms, have been completed on the East-West Center (EWC) PDP-11/70 using USER-11 software. The data entry and verification systems were developed with input (suggestions) from the Data Management and Technical Services data entry personnel while the data validation system was developed in close cooperation with research assistant Darryl Tagami. All systems were designed with the user in mind, with data entry, checking, and editing operations made as simple and effective as possible. Currently under development are procedures for data transfer from the EWC facilities to the

University of Hawaii IBM 370/158 where the data will be converted from ASCII tape files to on-line SAS files for summarization and analysis.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

Scientists Prepare for Larval Pollock Studies in the Bering Sea

Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division, Gail Theilacker, Fishery Biologist, and Liz Clarke, graduate student at the Scripps Institution of Oceanography (SIO), will participate in a cruise in the Bering Sea aboard the SIO research vessel Alpha Helix in May to study the threshold feeding of pollock larvae. Lasker has a grant from the University of Alaska to study pollock larval fish dynamics with Dr. Howard Feder. Feder's group in Seward, Alaska, has been successful in spawning pollock in captivity with the aim of providing larvae for the May cruise. A special apparatus was built this month for suspending feeding larvae and their food aboard ship. Various areas in the Bering Sea will be tested for above-threshold levels of microplankton and their ability to induce feeding in first-feeding pollock larvae. This month was used in preparation for the cruise. Clarke is to leave early in April for Seward, where preliminary experiments will be done on pollock larvae. Theilacker will present a seminar at the NMFS Auke Bay Biological Laboratory and the University of Alaska in Juneau before she and Lasker join the Alpha Helix in Seward on May 8.

Data on Pelagic Fish Stocks, Anchovy Egg Production Method Collected on JORDAN Cruise

On March 11, the NOAA research vessel David Starr Jordan returned to San Diego after a 52-day cruise in waters off the coasts of California and Baja California. The scientific objectives of the cruise were to: 1) continue an ongoing assessment of pelagic fish stocks between San Francisco, California, and Boca De Las Animas, Baja California, Mexico, and to monitor environmental conditions within the survey area; and 2) document and improve technical procedures for the egg production method of estimating biomass, particularly the estimation of daily egg production in the sea.

The cruise was divided into four legs. During Legs I-III, CalCOFI stations 60-110 were occupied. A vertical egg net haul to 70 meters was made at all stations. CalCOFI bongo tows with 300 meters of wire out, 10-meter Nansen bottle for temperature and salinity observations, surface net (manta) tows, and CTD casts to 500 meters were conducted at selected stations. During Leg II, paironet (paired vertical tows) were also made for egg extrusion/disintegration studies.

Leg IV was conducted only in the Los Angeles Bight area. Continuous simultaneous tows with 33-, 150-, and 75-micrometer meshes were conducted in order to compare the amount of anchovy egg extrusion among the different mesh

sizes. The samples were collected around the clock at the same station in order to get a time-series comparison of catch. Midwater trawls were also conducted to collect adult anchovies for sex ratio and fecundity studies. These trawls were conducted at night so that the fish could not avoid the net. (Detailed reports of different scientific aspects of the Jordan cruise can be found in the following pages of this issue.)

Biological technician Bill Flerx served as Cruise Leader on Legs I-IV and fishery biologist Dr. Paul Smith acted as Chief Scientist on Leg IV. Other Southwest Fisheries Center personnel on the various Legs of the cruise included: Dimitri Abramenkoff (biological technician), Ken Bliss (oceanographer), Rich Charter (CalCOFI data manager), Dr. John Graves (NCR/NOAA research associate), Roger Hewitt (NOAA Corps officer), Dr. Nancy Lo (mathematician), Alec MacCall (California Fish and Game biologist at the SWFC), Dr. Rick Methot (fishery biologist), Jack Metoyer (biological technician), Scott Miller (biological aid), Ken Raymond (illustrator/photographer), and Shari Sitko (general biologist).

(The photographs of Leg IV of the Jordan cruise which appear on pages 18 to 25 were taken by photographer Ken Raymond.)

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

PFMC Anchovy Plan Amendment Reviewed

In July 1981 the Pacific Fishery Management Council (PFMC) asked members of the Anchovy Management Plan Development Team to draft an Anchovy Plan amendment which would specify a procedure for mid-season stock assessment and possible reallocation of the optimum yield. In February the Anchovy Team developed this draft amendment and circulated it to members of the PFMC Scientific and Statistical Committee for comments. Those comments were received, and the Team responded to them. The draft amendment was reviewed by the Anchovy Advisory Subpanel: the recreational fisheries contingent of the Subpanel was for the proposed amendment and the commercial fisheries contingent was against it. The draft amendment was presented to the PFMC on March 18, but the Council decided to discontinue development due to budgetary constraints.

A schedule was developed for revision of the Anchovy Plan itself. The first draft of the revised Plan will be presented to the PFMC in November 1982.

Work Continues on Anchovy Biomass Estimate

The data collection at sea for the anchovy egg production biomass estimate has been completed. Susan Picquelle, Statistician, examined all the trawl data sheets, corrected apparent errors, and submitted the data sheets to keypunching. The actual processing of the trawl samples is continuing at a good rate, involving many of the researchers in the Coastal Division.

Processing of the plankton samples has been completed. The samples were expeditiously sorted by the plankton lab and the anchovy eggs were then transferred to the larval lab staff, who successfully completed the task of assigning developmental stages to each egg. Based on these staging data, Picquelle, Roger Hewitt, NOAA Corps Officer, and Alec MacCall, California Department of Fish and Game Fishery Biologist, assigned ages to the eggs; that is, they estimated the number of days that had elapsed between the time the egg had been spawned and the time it was sampled. This estimation procedure uses the growth model developed by Dr. John Hunter, Fishery Biologist, and James Zweifel, Statistician at the Southeast Fisheries Center, NMFS, and depends on the developmental stage of the egg, water temperature, and time of the tow. Next, a mortality function will be fitted to the egg data, which will provide the estimate of egg production for the biomass estimate.

Simulation of Egg Production Biomass Estimate Continues

This month statistician Susan Picquelle continued working on her simulation project to examine the variance structure of the biomass estimate produced by the egg production model. This model contains five estimated variables: egg production, average female weight, batch fecundity, sex ratio and spawning fraction. Picquelle examined the sampling distributions of the last four of the variables, and fitted theoretical probability distributions to their observed distributions for the two 1981 data sets. She then performed preliminary goodness-of-fit tests to check the agreement between the observed and theoretical distributions. These theoretical distributions will be used in the program Picquelle has written that generates repeated observations of the biomass estimate, given the parent distributions of the individual variables.

Catch Rates from High-Speed Net Tows Examined

This month fishery biologist Dr. Rick Methot and NOAA Corps officer Roger Hewitt investigated the catch rates of anchovy larvae using high-speed bongo nets during the R/V David Starr Jordan cruise. According to Methot, much of the past work on the ecology of anchovy larvae has been based upon samples collected with the standard CalCOFI Bongo net. This sampler is suitable for collecting larvae up to about 15 mm in length, but larger larvae are not captured in sufficient numbers because of their ability to avoid the net and

PHOTOGRAPHS FROM LEG IV OF THE R/V DAVID STARR JORDAN CRUISE

1. "Chip" Jensen, Southwestern College, attaches the 75-micrometer mesh liner to the trivet tow frame.
2. Jensen measures the wire angle of the submerged tow.
3. Fishery biologist Dr. Rick Methot and Jensen watch the tow being hauled up.
4. Biological technician Jack Metoyer washes down the nets with sea water after a tow in order to concentrate the collected organisms into the mesh liner at the bottom end of each net.

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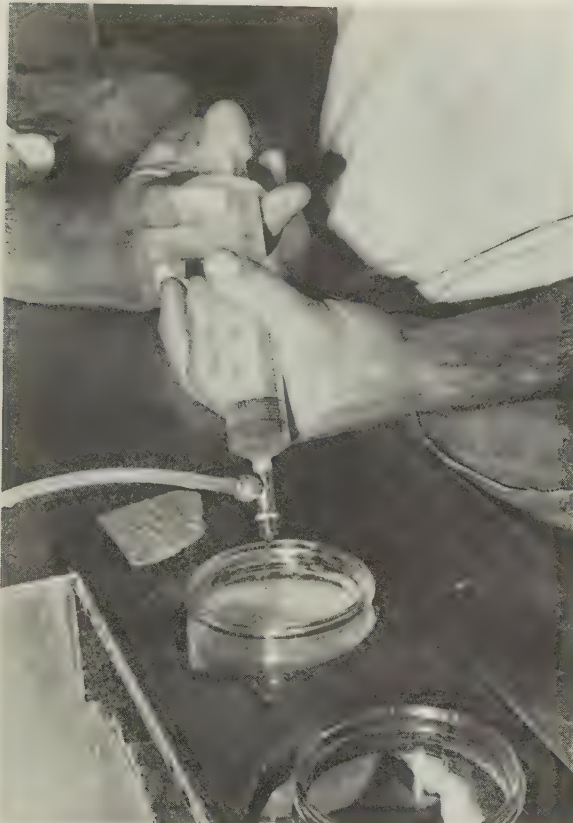
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5. Mathematician Dr. Nancy Lo records tow data onto specimen jar labels.
6. Dr. Rick Methot uses sea water to wash organisms from each mesh liner into a separate specimen jar.
7. He then adds 25 cc of formalin to each jar to preserve the tissues of the collected organisms.
8. Finally, 10 cc of borate are added to keep the formalin from turning acidic and ruining the specimens.

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9. When not in use, the midwater trawl net is wound around this net reel. The reel will help anchor the net as it is being let out or reeled in.
10. SWFC scientists and Jordan crew members untangle the net's metal floats while the net is being winched in.
11. Jordan crew members arrange the lines of the net as it is hauled in. Note that some of the metal floats have already been wound onto the net reel.
12. Crew members examine anchovy held in the end of the midwater trawl net.

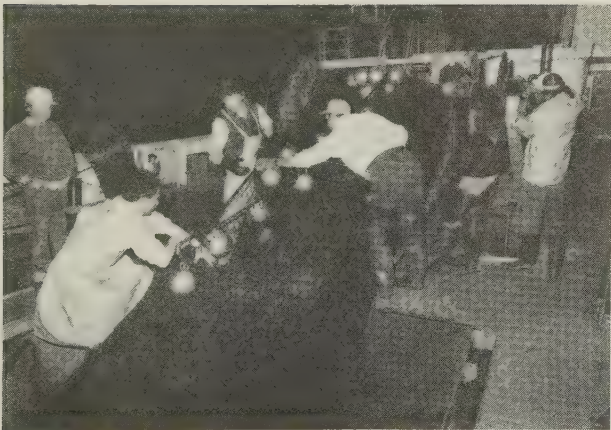
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13. Dr. John Graves, NCR/NOAA Research Associate at the SWFC, collects samples of adult anchovy taken from the midwater trawl net for blood and fecundity studies.
14. Dr. Graves takes a blood sample from one of 50 randomly-chosen adult anchovy. The blood samples will be analyzed by Graves for the amount of egg yolk protein they contain. In addition to taking blood samples, Graves will sex each fish to obtain a sex ratio for each midwater trawl, then preserve the fish whole for later examination in the laboratory.

13



14



because of the small volume of water which is filtered. Information on the distribution and abundance of large larvae is becoming increasingly important for evaluation of hypotheses regarding offshore drift of larvae and nearshore nursery areas.

In June 1979, Methot compared the catch rate of the standard Bongo net to the 6-ft Isaacs-Kidd midwater trawl (IKMT). The larger, faster IKMT filtered 47 m³/m depth and the Bongo only filtered 1.7 m³/m depth. Because of this large difference in filtration, the IKMT captured many more large larvae: at 11 of 20 stations anchovy larvae over 21 mm in length were captured in the IKMT as compared to only 1 positive station for the Bongo. However, when the results are corrected for the difference in filtration, the catch rate in the IKMT was less than the catch rate in the Bongo:

size (mm)	13-14	15-16	17-18	19-20	21-24
IKMT/Bongo	0.18	0.30	0.39	0.27	3.20

Many larvae smaller than 13 mm certainly are extruded through the 2-mm mesh of the IKMT, but this factor is unlikely to account for the undersampling of larger larvae. A possible problem with the IKMT is the inability of the technicians to thoroughly rinse the net after towing or to tow near the surface without being in the wake of the ship.

During the Jordan cruise, Hewitt and Methot investigated the feasibility and utility of towing the Bongo net faster than 0.7 m/sec. They found that a speed of 1.8 m/sec (3.5 knots) could be achieved by increasing the weight on the net frame from 75 to 200 lbs and by increasing the angle of the towing cable from 45° to 65°. Samples with the standard Bongo, hi-speed Bongo, and 6-ft IKMT were taken at 12 stations. Initial scans of the samples indicate that many larvae larger than 20 mm were captured by the hi-speed Bongo at the three stations along the 20-fathom isobath but not at stations over deeper water. Extensive comparison with the IKMT will not be possible because both IKMT nets ripped after a few tows at 4 knots.

Paper on Age-Length Relationships of Blue Rockfish Completed

Fishery biologist John MacGregor has completed a paper on the growth of blue rockfish, Sebastes mystinus. One problem encountered in the literature on rockfish is that various authors have presented their length data as standard length, fork length, or total length, without giving conversion formulas. MacGregor made all three measurements for all rockfish sampled to date in order to get conversion factors which allow comparison of data with those of other investigators. For the blue rockfish, the data on length-weight and age-length compare fairly well with those of other studies.

The Von Bertalanffy curve is generally used to describe age/length. For the blue rockfish and other species, this curve gives calculated lengths which deviate from observed lengths by only a few millimeters. The greatest deviation is usually found for the very smallest and largest specimens, but because these sizes are not frequently taken, this would be of little concern in applying the age-length curve values to population dynamics problems.

In reality, a power curve of the type $Y = a + bX + cX^2 + dX^3$ generally gives a better fit than the Von Bertalanffy curve. Since age (X) is a series of consecutive small numbers, this power curve is no more difficult to compute than the Von Bertalanffy curve, and the values of length (Y) are more easily obtained using a table of squares and cubes. However, this formula has not been used by other investigators.

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION

Live Anchovy Egg Volumes Estimated from Strobe Photos Taken at Sea

During the recent cruise of the NOAA research vessel David Starr Jordan photographer Ken Raymond and fishery biologist Dr. Paul E. Smith established the live size of anchovy eggs in the sea using a relatively recent photographic method. A freshly-caught plankton sample from a 75-micrometer mesh net was put into a clear container and the container placed on top of photographic paper; a contact print of the sample was then exposed by a strobe light. The contact print could then be examined to determine the sizes of anchovy eggs in the sample. For some reason not yet determined, anchovy eggs are lost from 333-micrometer mesh nets; this is puzzling because the mean width of anchovy eggs is of the order of 700 micrometers.

Three types of loss of anchovy eggs through the meshes are postulated: escapement, extrusion, and disruption. Escapement would be implicated if the anchovy eggs varied greatly in width, the smaller ones slipping easily through the 33-micrometer mesh but being retained fully by 75-micrometer mesh. Extrusion would be implicated if larger eggs were compressed by force and passed through the 333-micrometer mesh. Disruption of the egg membrane for passage through the larger meshed nets would also endanger the accuracy of fine mesh nets since disruption could result in loss through any mesh size.

The simplest postulate to test is "escapement" since one need know only the frequency distribution of egg widths and mesh sizes. Extrusion and disruption will need to be tested through rigorous simulation of natural sampling conditions with live eggs and known filtration pressure and variable filtration pressure.

The test conducted this month has essentially eliminated the "escapement" hypothesis since the minimum egg width is likely to be of the order 500 micrometers (the maximum likely live size estimated from this sample is 900 micrometers). Further information on extrusion should be available when all the samples from this cruise are sorted and measured because 142 simultaneous tows with 33-, 150-, and 75-micrometer meshes were conducted as part of this project. (In general, the size and shape of the live eggs in this project show the same variation as preserved eggs in previous work on anchovy.)

COASTAL EASTERN PACIFIC: POPULATION OF FISHES

Spawning Frequency of Anchovy Investigated by Monitoring Production of Egg Yolk Proteins

The egg production method of estimating spawning biomass requires information about the number of times a female fish spawns during the course of a season or year. Recent studies of the incidence of post-ovulatory follicles in female anchovy have indicated that females may spawn as frequently as once a week during peak spawning season and as many as twenty times in a year. These numbers represent a considerable increase over the previous estimate of three spawnings per year which was based on the number of oocyte size modes within the ovary. In an effort to determine the spawning frequency of female anchovy independently of histological criteria, Dr. John Graves, NCR/NOAA Research Associate at the La Jolla Laboratory, is investigating the physiological basis and rate of egg yolk protein production.

In female anchovy, egg yolk proteins are synthesized in the liver as one large protein, vitellogenin, which is transported through the circulatory system to the ovaries. Vitellogenin is incorporated into the growing oocytes by pinocytosis and cleaved to form a number of different egg yolk proteins. Batches of oocytes appear to be yolked over a short time interval (possibly 1 to 3 days of a 7-day cycle) and, as a result, vitellogenin levels probably vary significantly over a population of spawning females due to their position in the spawning cycle. By surveying vitellogenin levels in the circulatory system (blood plasma) of the female anchovy, it may be possible to estimate independently the frequency of actively spawning females and the duration of a population's reproductive cycle.

Vitellogenin, the egg yolk protein precursor, is a large, highly phosphorylated protein with a large number of associated calcium ions. Vitellogenin concentrations have been determined from the blood of several species of fishes but the small amount of blood available from an individual anchovy (typically 0.04 ml) precludes the use of most techniques. However, two very sensitive methods are available to determine anchovy vitellogenin concentrations: a radioimmunoassay of an egg yolk protein and atomic absorption spectrophotometry of plasma calcium levels.

Atomic absorption spectrophotometry of anchovy blood plasma calcium levels provides a cost- and time-efficient means of surveying the reproductive condition of a large number of females. Because each molecule of vitellogenin has several associated calcium ions, large blood plasma concentrations of vitellogenin result in elevated blood plasma calcium levels. Preliminary data from laboratory-reared fish have indicated that female anchovy with growing oocytes have higher calcium levels than males, immature females, or females which have fully developed eggs but have not yet spawned:

	<u>N</u>	<u>[Ca] mM</u>	<u>S.D.</u>
males	30	2.90	0.60
immature females	29	3.08	0.62
mature females (yolking oocytes)	15	4.82	0.78
mature females (yolked oocytes)	15	3.71	0.91

The difference in calcium levels between female fish which are actively yolking eggs and others must be demonstrated to be related to an increase in vitellogenin concentrations if inferences about spawning frequency are to be made. Therefore, a radioimmunoassay is being developed to measure the concentration of vitellogenin in the very small blood samples and purification techniques for isolating a specific egg yolk protein are presently being evaluated. Once purified, the protein will be serially injected into a rabbit which will produce antibodies to the foreign protein. These antibodies will then be collected and coupled with a radioisotope label. Plasma levels of vitellogenin will then be quantitatively assayed by reaction with the labeled antibody and vitellogenin concentrations will be correlated with calcium levels.

During February and March blood samples were obtained from 650 female anchovy taken in midwater trawls aboard the R/V David Starr Jordan. In addition, enough eggs were obtained from laboratory-spawned fish to start the purification procedures for the radioimmunoassay. The calcium levels and maturity of the field-caught fish should be determined by early May and the radioimmunoassay completed by the end of June.

Starvation of Jack Mackerel Larvae Studied

As part of an ongoing study to evaluate factors which affect the survival of fish larvae in the sea, fishery biologist Gail Theilacker is determining the incidence of starvation-induced mortality of jack mackerel larvae collected from a 24-square mile area about 200 miles off San Diego, California. She has just completed a pilot study to determine the numbers of larvae she needs to examine from each collecting station in order to yield good estimates of the incidence of starvation as related to size/age. For this preliminary analysis, Theilacker chose a high density, centrally located station. All 210 larvae collected at the station were measured: sizes ranged from 2.3 to 5.1 mm standard length, the median size was 3.4 mm, and the frequency distribution was normal. One-third of the larvae, taken from four size classes, underwent five body-part measurements, and were then prepared for histological examination. Jack Metoyer, Biological Technician, assisted Theilacker with the histological preparation and Tom Bosy, student from Southampton College, helped to age the larvae.

Theilacker graded the field-collected larvae by examining the digestive tracts, pancreas, liver, and musculature, and classified the larvae into four categories: healthy, recovering, starving, and dying. "Healthy" larvae resembled actively-feeding, laboratory-reared larvae; "recovering" larvae showed signs of feeding and digestion and also showed signs of starvation; and

"starving" larvae resembled larvae which had been artificially starved for 2 to 3 days. The "dying" category has not been observed in artificially-starved larvae but only in laboratory-maintained larvae which were found lying on the bottom of the rearing tank. The midgut of these larvae had degenerated to a homogeneous mass of necrotic debris.

If starvation is one of the principal causes of larval mortality, then a significant number of the larvae studied should show signs of starvation because starving larvae may exhibit these signs for several days. In this sample, 14% of the larvae were observed to be either "starving" or "dying," 42% were "recovering," and the remainder were "healthy." In the laboratory, Theilacker determined that "recovering" larvae that had missed 1 day of feeding showed complete tissue regeneration after resuming feeding for 2 days. Larvae that experienced 2 days of food deprivation required 4 or more days of feeding before complete tissue regeneration occurred. Thus, larvae graded as "recovering" may retain those characteristics for as long as 4 days. These larvae have missed a few meals and are still surviving and recovering. Of the 14% of the larvae that were "starving," 8% were "dying"; these larvae had starved more than 3 days and probably less than 4 days. Thus larvae may show starving signs for as long as 4 days. Using the 14% value for the incidence of starvation, an estimate of the daily mortality due to starvation at this station is about 3.5% per day.

In addition, if starvation is the principal cause of larval mortality, then the average growth rate should be slower than expected because starving larvae do not grow and growth is retarded in "recovering" larvae. Theilacker showed that in the laboratory, "recovering" larvae do not grow until tissue regeneration is complete; this may take 2 to 4 days. The growth rate of actively-feeding larvae in the laboratory is about 0.1 mm/day until 2 weeks of age, when it increases to 0.2 mm/day. The average growth rate of the larvae collected at this station, as estimated by counting daily increments in the otoliths, was 0.13 mm/day. Thus the average growth rate of these larvae, which ranged in age from 7 to 12 days, is comparable to growth of laboratory larvae.

Although 56% of the larvae collected at this station showed signs of starvation (14% "starving" and "dying," and 42% "recovering"), the low estimated daily mortality and the usual expected growth rate shown by these larvae both suggest that starvation is not a major cause of larval jack mackerel mortality.

ECOLOGY AND TAXONOMY OF FISHES OF THE CALIFORNIA CURRENT

Moser to Study Larval Fish in Japan

Dr. Geoff Moser, Program Leader, departed for Japan on March 2 for a 2-month visit to the Ocean Research Institute of the University of Tokyo. As a guest of the Institute's Fisheries Ecology Division, Moser will work with Dr. K. Kawaguchi to study larval fishes.

Program Staff Help to Process Cruise Data

During Dr. Moser's absence this month, his staff assisted visiting scientist, Dr. Tilman Pommeranz of Kiel University, Kiel, Germany, in retrieving and editing data for the upcoming administrative reports summarizing the information gathered on the Messhai Cruise E. B. Scripps 8003. Staff members also staged all anchovy eggs from the Egg Survey Cruise, CalCOFI 8202, and passed the resulting data on to statistician Susan Picquelle and NOAA Corps officer Roger Hewitt for statistical analysis.

Preparation of Ahlstrom Symposium and Book Continues

Work continued this month on the preparation for the Ahlstrom memorial symposium, "Ontogeny and Systematics of Fishes," to be held in August 1983, and the book of collected papers which will result from the symposium. The second information letter was mailed to manuscript contributors this month. Almost all of the symposium participants have been lined up and draft outlines are requested by June 1982.

Oceanic Fisheries Resources Division

MARINE MAMMAL BIOLOGY PROGRAM

New Studies Initiated for 1985 Dolphin Stocks Assessment

Dr. William Perrin, Leader of the Marine Mammal Biology Program, reports that new studies of dolphin life history will be initiated by Southwest Fisheries Center scientists to provide information for a 1985 assessment of the status of dolphin stocks involved in the tuna purse seine fishery in the eastern tropical Pacific. The studies are a response to the workshop held on cetacean reproduction at the SWFC in December 1981 (part of the Conference on Cetacean Reproduction) which resulted in several conclusions and recommended caution concerning assumptions and limitations of currently-used estimates of reproductive rates. SWFC staff in the Marine Mammal Biology Program and the Marine Mammal Assessment and Monitoring Program have met several times since the workshop to discuss implications of the workshop findings and to plan new studies and modifications to on-going research which would take these findings into account. Several areas of research are under consideration: estimating length of lactation, interpreting ovarian corpora albicantia (CA's), detecting and understanding the significance of female senescence, and assessing male maturity and the significance of seasonality. A plan has been agreed on and staff assignments made to develop new directions in these areas, all of which relate to estimates of vital rates which will be used for future new assessment of dolphin stocks.

Cetacean Line-Transect Cruise in Los Angeles Bight Planned

The NOAA research vessel David Starr Jordan will spend 3 weeks next month (April 5-25) conducting line transects to assess densities of cetaceans in the Los Angeles Bight. The cruise will be the first test of a new system designed to determine with greater precision the position of marine mammal schools from the vessels through accurate measurement of distance and angles of sighting. The development and testing of the system are being coordinated by Dr. Rennie Holt, Operations Research Analyst.

In the Bight the scientists on the cruise will first collect information on the performance and design capabilities of the new system with fixed objects. It will then be tested for about 10-14 days in an actual survey of pilot whales along track lines previously surveyed by the University of California, Santa Cruz, in 1975-1978. During this test, an aerial survey will also be conducted for comparison of aerial sighting rates with the Jordan's sighting rates. In addition, environmental data will be collected for correlation with marine mammal sightings. The results of the survey will form part of the data base for determining the abundance of pilot whales in the Los Angeles Bight.

Satellite Tracking of Pilot Whale Planned

Jaqueline Jennings, Fishery Biologist, reports that she has completed initial check-out tests of the satellite transmitter for an upcoming pilot whale study. This transmitter, which Jennings originally used to track a dolphin off Hawaii in 1981, has been refurbished to be used on a pilot whale. The Hubbs/Sea World Research Institute (HSWRI), under contract to the SWFC, will be visually documenting the pilot whales and making acoustical records. The saddle for the satellite transmitter will also hold a CB radio transmitter to allow the HSWRI team to track the whale.

An aircraft equipped with a receiver similar to that in the tracking satellite but modified with an automatic direction finding capability will also be used to track the tagged animal. Jennings expects the experiment to last about 10 days. Final scheduling depends on the availability of the whale catcher and repair of the tracking station but should begin in early April.

Paper Presented on California Sea Lion/Fishery Interactions

Dr. Douglas DeMaster, Coastal Marine Mammal Project Leader, presented a paper at the 47th North American Wildlife Conference, Portland, Oregon entitled "Assessment of California sea lion/fishery interactions." The paper, which is co-authored by Daniel J. Nutles, Daniel Goodman, Robert DeLong, and Brent S. Stewart, discusses the damage caused by sea lions in seven California fisheries. The major loss is in the commercial salmon trolling fishery and is primarily due to depredation of fish caught. Gear damage is only significant in the gill-net fisheries. The reported incidental take of sea lions is roughly 1800 animals, mostly in the shark gill-net fishery. A new procedure

for assessing the status of sea lion populations is presented and suggests that at least the San Miguel Island population of sea lions is above the level where maximum net productivity occurs. Interaction rates were not found to be highly correlated with sea lion numbers; therefore, moderate reductions of sea lions will most likely not be effective in ameliorating sea lion/fishery interactions.

This paper was presented in a special session on marine mammal/fishery interactions that was co-chaired by D. G. Chapman and L. L. Eberhardt.

Research Initiated on Sea Lion/Commercial Sport-boat Interactions

This month research was started to investigate methods for mitigating losses from California sea lion interactions to recreational fishermen on commercial sport-boats (party boats). Wildlife biologist Dr. Douglas DeMaster and biological technician Lisa Fenn of the SWFC and John Scholl of the California Department of Fish and Game acted as observers on a local San Diego party boat. Information on catch rates before and after the appearance of sea lions, damage rates to captured fish, and age-specific behavior of sea lions was collected. A major objective of the study is to determine if individual animals are causing most of the interactions or if it is a general population phenomenon. Data from the trip are now being analyzed.

Pinniped Biological Studies Continue

Biological technician Mark Lowry has completed the final draft of the pinniped food habits research work plan for studies on California sea lions, Zalophus californianus, and harbor seals, Phoca vitulina. He is also comparing tooth layer-ageing techniques (acid etching with decalcification-staining) for ageing sea lions. Comparisons of dentine and cemental layers will be made for incisors, canines, and premolars. On March 25-27, Lowry represented the Coastal Marine Mammal Program at the Seventh Annual Conference on Marine Mammals of Baja California held at La Paz, Mexico.

Number of Censuses Required to Detect Trends in Pinniped Populations Discussed

On March 23, Dr. Tim Gerodette of the Scripps Institution of Oceanography presented a seminar at the Southwest Fisheries Center on results of his SWFC-sponsored study to determine the number of censuses (or years between first and last census) that are necessary to detect a trend in the population growth rate of pinnipeds. The model requires initial input concerning the annual rate of population change (RPC) and the coefficient of variation (CV) for the population index that is to be used. The series of population simulations allows a researcher to determine the number of censuses needed for various

statistical confidence levels. In general, the number of censuses increases as the CV increases and as the RPC decreases. Increasing the level of confidence also increases the required number of censuses. The results of Gerodette's study are being prepared as a report for the SWFC.

Manuscript Completed on Fine Layering in Mammalian Hard Tissues

Dr. Al Myrick, Leader of the Marine Mammal Age Determination Project, has completed the final draft of a paper entitled, "Time significance of layering in some mammalian hard tissues and its application in population studies." It summarizes results showing that the fine layers in teeth and bones of sirenians and toothed cetaceans probably represent lunar-monthly or daily records. The layering patterns may be applied in estimating lengths of gestation periods, reproductive seasons, and prenatal and postnatal growth rates. Similar patterns occur in hard tissues of other mammalian groups. Investigations of these patterns could result in more accurate estimates of age-related biological parameters for such groups. The paper is being prepared for the Third International Theriological Congress, to be held in Helsinki, Finland, in August, 1982.

Marine Mammal Carcasses Recovered for Research

During March five stranded pinnipeds--four California sea lions (Zalophus californianus) and one harbor seal (Phoca vitulina)--were recovered by the staff of the Cooperative Marine Mammal Salvage Program. The harbor seal was pregnant with a term fetus and was a possible gunshot victim. The specimens were too decomposed to allow determination of cause of death. Tooth samples were collected from all specimens for ageing studies, and stomach contents were collected from three specimens for food-habits analyses.

The Salvage Program annual report for 1981 is in preparation. A total of 140 specimens, representing 12 species, were collected. Most of the strandings were of California sea lions. Of the 35% of the sea lions that were in good enough condition to necropsy, approximately 30% had died of human-related causes (gunshot or drowning).

TUNA/BILLFISH RESOURCES PROGRAM

Northern Bluefin Tuna Data Reviewed

Doyle Hanan, California Department of Fish and Game Marine Biologist stationed at the La Jolla Laboratory, has completed a contract report and data base on bluefin tuna for the Southwest Fisheries Center. The final report is entitled, "A review of the northern bluefin tuna fishery in the eastern

Pacific Ocean" and represents 2 years of work to establish a bluefin tuna data base at the SWFC and to analyze the data. The report will be submitted to a journal for consideration for publication.

Recent declines in total catch (10,561 mt in 1976 to 10,016 mt in 1981) have been accompanied by significant decreases in catch-per-unit-effort (Figure 1) by purse seiners operating in the eastern Pacific Ocean. In the paper, Hanan infers that these declines represent a serious reduction in the availability of bluefin tuna in the eastern Pacific Ocean. This observation is consistent with other indices of availability which show a decline in numbers of northern bluefin tuna throughout the whole Pacific Ocean.

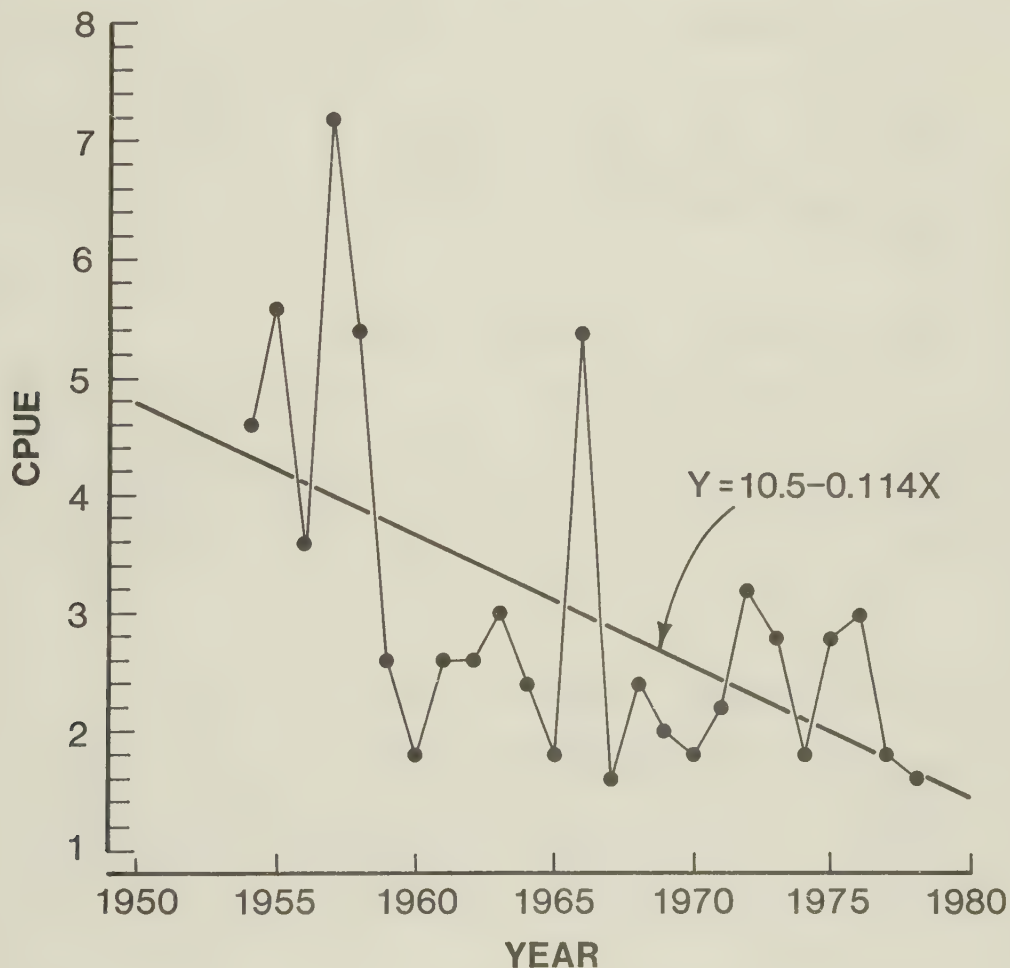


Figure 1. Catch-per-unit-effort (mt/boat days) of northern bluefin tuna in the eastern Pacific Ocean, plotted against year with the regression line fitted to the curve.

Tuna Data Base Updated

The 1979 Korean longline catch and effort data have been added to the tuna data bases at the Southwest Fisheries Center, and copies of the data have been sent to the SWFC's Honolulu Laboratory and to the NMFS Southeast Fisheries Center in Miami, Florida. Data were prepared for computer entry by the Inter-American Tropical Tuna Commission through a cooperative arrangement. The 5-degree square, monthly data on tunas, billfishes, and sharks include catch in number of fish and effort in number of hooks.

Status of Atlantic Tuna Fishery Sampling Programs

Foreign-caught Atlantic tunas transshipped to Puerto Rico are sampled routinely for biological information by Biological Technician Eugene Holzapfel. Since the beginning of the calendar year, 10 yellowfin, 5 skipjack, and 4 bigeye tuna samples of 50 fish each have been taken. Data on fork length, weight and species composition of catches are collected for each sample.

NMFS Marine Game Fish Programs Discussed

Representatives of all marine game fishing organizations in the San Diego area (San Diego Council of Clubs) meet quarterly. At the March 18 meeting, fishery biologist Jim Squire presented a report on the NMFS Cooperative Marine Game Fish Tagging Program and the annual Pacific Billfish Angler Survey. Squire answered questions relative to the programs and also spoke on the operations of foreign longline fishing for billfish in the eastern Pacific and its possible influence on California catches.

Initial Plans Made to Acoustically Track Swordfish

Plans are being developed by Oceanic Division personnel to deploy depth-sensitive acoustic transmitters on swordfish in the California Bight. Local movements as well as surface basking and vertical migratory behavior will be studied. The transmitters (approximately 1 inch in diameter x 6 inches long) will be attached to small darts harpooned into the back of surface basking animals; transmitter life is approximately 3 days with a 3-km range.

Mexican Longline Data Sought

Fishery biologist Jim Squire and marine biologist Doyle Hanan (California Department Fish and Game) traveled to Ensenada, Mexico, this month to meet with officials of the Japanese-Mexican consortium that is conducting longline operations for billfish and sharks off Mexico. About 8-10 Japanese-Korean-registered longliners are now operating out of Ensenada on a joint venture agreement. Current catches are 85-95% striped marlin and swordfish with small number of sailfish, tuna and sharks.

Squire and Hanan visited the Japanese longliner, Chidori 88, and held discussions with the fishing captain about common and bigeye thresher shark catches off Baja California. These species are also taken by the California drift gill net fishery and longline hooks have been observed in the mouths of sharks caught in this fishery.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Spring Shortbelly-Rockfish Cruise Successful

This month fishery biologists of the Predator/Prey Task were successful in collecting samples of gut contents of shortbelly rockfish and the plankton assemblages these rockfish feed upon. The samples were taken off central California during 2 days of unseasonably calm seas which occurred during the cruise. The seas off central California are usually very rough during early spring, and for this reason the March research cruises which took place during the first 2 years of the shortbelly rockfish study were largely unsuccessful.

Cruise leader Tony Chess reports that nine midwater trawls were completed and shortbelly rockfish were taken in two pre-dawn and one pre-sunset collection. These samples will be studied to help define any diel pattern that may exist in the feeding habits of this species. The fish taken were relatively small (range 99-228 mm SL, $\bar{x}$ = 149 mm), and, based on echo-sounder readings, were not in large aggregations as have been found at other times of the year.

FISHERIES DEVELOPMENT INVESTIGATION

Japanese Exhibit of West Coast Fishes Planned

Sus Kato, Chief of the Fisheries Development Investigation, reports that he has met with personnel representing Unico Japan (USA) Ltd. of Los Angeles, California, to discuss a proposed exhibit in Japan of West Coast fishes. Unico is a subsidiary of the Japanese National Federation of Agricultural Cooperative Associations, which has a membership of about seven million Japanese households. Most of these households buy commodities from 1800 supermarkets controlled by the cooperatives.

As part of its 10th Anniversary Celebration, Unico is planning to exhibit a display of "Fishes of California" in Osaka this summer. The firm is interested primarily in low-cost underutilized fishes, and has requested help from Tiburon Laboratory personnel in identifying such species and possible suppliers. Unico plans to ship 12 tons of fish for the exhibit.

According to Kato, this presents an excellent opportunity to introduce into Japan a number of new seafood products, both frozen (traditional) and processed (new). At present the following species are being targeted: shortbelly rockfish, Pacific sanddab, English sole, Dover sole, Kellett's whelk, large jack mackerel, small jack mackerel, surf melt, small sablefish,

squid, California king crab, striptail rockfish, ocean shrimp, blue rockfish, angel shark, and possibly ocean sunfish. Fishermen and processors from Crescent City to San Diego, California, will be involved in this project, and most industry members contacted have been enthusiastic about the proposed exhibit. However, final plans still need to be made and a budget drawn up and approved before the exhibit will become a reality.

Trial Fishing for Yellowfin Goby Continues

This month fishery biologists Bill Leet and Sennen Salapare made several more fishing trips on San Francisco Bay to catch yellowfin gobies (*Acanthogobius flavimanus*). This fish, which was accidentally introduced into the Bay in the 1960's, has become abundant and is considered a potential threat to the native fauna of the Bay. Leet and Salapare used minnow traps and the Tiburon Laboratory's small bottom trawl in their fishing attempts. However, thus far both types of gear have been more effective in catching bay shrimp (*Crago* sp.) than gobies. Work will continue in April using both types of gear.

Beam Trawl Catches Sea Cucumbers

A fisherman fishing for sea cucumbers out of Santa Barbara, California, has been successful in using the Tiburon Laboratory's beam trawl. He has been fishing for sea cucumbers in shallow water (<50 fm), but plans to try the trawl when fishing for shrimp in deeper water. Insofar as data permit, fuel efficiency and catch efficiency comparisons will be made with other fishing vessels using other gear.

Sablefish Yield Study Completed

The consulting firm of Cooperrider-Ryan has completed a study designed to determine the recovery rate of different sizes of sablefish and to identify the various markets where this species can be utilized. The study, which has been underway for a year, has determined the yield by size and product form of sablefish landed in Monterey, California. The final report is being rewritten for submission to the working group on the Monterey Bay sablefish fishery. This group consists of personnel from the California Department of Fish and Game; National Marine Fisheries Service, NOAA; Sea Grant College Program; University of California, Santa Cruz; and private citizens who are doing, or have done, work on aspects of the Monterey Bay sablefish fishery.

PHYSIOLOGICAL ECOLOGY INVESTIGATION

Study Planned on the Effects of Sublethal Concentrations of Benzene on Blood Parameters of Young Adult Striped Bass

The results of the past 4 years' field sampling study to assess the viability of the San Francisco Bay-Delta striped bass population have provided a large volume of information concerning the physiological condition of the stock. Of particular interest is the high tissue concentration of monocyclic aromatic hydrocarbons (MAH), most notably benzene. These compounds are major components of petroleum and refined petroleum products. However, despite their serious toxic potential these chemicals have received little attention from environmental researchers, presumably due to the belief that their high volatility will prevent them from accumulating appreciably in water or biotic compartments. The field data indicate that this conception is not entirely accurate.

Moreover, a multivariate factor analysis which included data on tissue burdens of other pollutants (PCB's, pesticides, and heavy metals) has revealed higher correlation between MAH concentrations and physiological variables than any of the other pollutants. Fish collected from the Bay-Delta system appear to be in relatively poor condition and show signs of serious physiological stress.

It is well known that benzene produces many deleterious effects in mammals as reflected by alterations in metabolism, blood cell distributions, immune response, and tissue structure, especially hemopoietic tissues. The effects of benzene on these functions in other vertebrate groups, including fish, are unknown. Considering this fact and the results of the field data analysis, an investigation on the effects of sublethal concentrations of benzene on young adult (a life stage little studied) striped bass blood components and tissues will be conducted this spring by oceanographer Dr. Bruce MacFarlane and staff.

Striped bass will be exposed to two sublethal levels of benzene in a flow-through system for up to 24 days. After 0, 2, 4, 8 hr, and 1, 2, 4, 8, 12, 16, 20, and 24 days of benzene exposure, replicates will be sampled from both benzene treatments and control tanks. Blood samples will be collected and the following parameters will be assessed: benzene, corticosteroids, triglycerides, glucose, lactate, pH, hemoglobin, hematocrit, total blood cells, differential blood cell distribution, serum proteins, lipoproteins and LDH isozymes. Following blood sampling, fish will be subjected to investigation-originated autopsy procedures and brain, kidney, liver, gill, spleen, and adrenal tissues will be processed for histological examination. The results of this study will determine the effects of benzene on metabolic functioning and blood dynamics for the first time in a nonmammalian vertebrate and will be used to corroborate field observations.



Biological technician Brian Jarvis of the Physiological Ecology Investigation inspects the heat exchanger of the seawater system at the Tiburon Laboratory. Jarvis is responsible for the system which is essential for the pollutant effects studies conducted at the Laboratory.

FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING

Procurement of Mini-Computer Requested

Fred Kellenberger, Data Systems Manager, reports that on March 11, the request for procurement of a mini-computer for the La Jolla Laboratory was air-expressed to William Gordon, Assistant Administrator for Fisheries in Washington, D.C. This action initiated the procurement approval process. The package has thus far been approved by NMFS, and on March 25 it was sent for review to NOAA's ADP Policy Division. The request is for the procurement of the hardware for Phase I of the mini-computer installation: a VAX 11/780 processor with 2 megabyte (MB) memory, 2-300 MB removable disk drives, 1-1600 BPI tape drive, 32 low speed ports for terminals, and 2 dial-up variable speed modems. It also includes the following DEC software: FORTRAN 77, BASIC, PASCAL, DATATRIEVE+CDD, and FORMS-11. Upon approval by the Department of Commerce of this package, a request will be submitted for the purchase of four video terminals and the BMDP, IMSL, and MINITAB software.

The mini-computer review committee met on March 11 to discuss Phase II of the acquisition plan. Attendees were Kellenberger, systems analyst Dorothy Roll, CalCOFI data manager Rich Charter, mathematician Al Coan, oceanographer Larry Eber, computer programmer analyst Robert Nydam, and biological statistician Bruce Wahlen. It was agreed that the revised Phase II acquisition list would meet the Southwest Fisheries Center's computing requirements for storage, terminals, and software packages. Phase II includes 2-300 MB disk drives, 1-1 MB memory expansion, a floating point processor, 1-600 LPM printer/plotter, a graphics package, terminals, lines, graphics terminals, DECNET, and SPSS. To assist the selection of software and peripherals for interface with the VAX computer system, Charter, Coan, Eber, and computer systems programmer Susan Iacometti will investigate available graphics packages. Charter and Roll will research videos, hard-copy, and intelligent terminals.

Initial Conversion of FRS to ADP Network Successful

Dorothy Roll, Systems Analyst, reports that the initial conversion of the Financial Reporting System (FRS) from INFONET to ADP Network Services was implemented with the successful execution of summary reports for February. Robert Nydam, Programmer Analyst, is designing and implementing changes/additions in the summary reports to meet the FY82 requirements. He is also documenting step-by-step procedures for on-line entry of commitment data. John Davies, Computer Specialist stationed at the Southwest Region Office, is refining the report program which monitors the labor data entries.

Procurement of IBM 100 Typewriter Requested

A request to procure an IBM Memory 100 typewriter for the Director's office was sent for approval process on March 25 to Washington, D.C. The typewriter is equipped with 100 tracks of information storage and has dual pitch. Pitch selection for 10 characters per inch and 12 character per inch is by a lever switch. The automatic capabilities include correction, centering, word underscoring, decimal tabulation, paragraph indent (14 levels), and end of ribbon shutoff. Cost benefit would be derived from the reduced number of secretarial hours to produce the existing work load and the reduction of the managers' time in reviewing the final copies.

Regional Fisheries Statistics System Being Designed

John Davies, Computer Specialist stationed at the Southwest Regional Office, is designing a regional fisheries statistics system. Initially, there will be access to two files: a catch file and a vessel description file. The catch file is a summarization of landing ticket information; the vessel file is at present the PACES vessel registration file. The following data elements will be contained in each file:

CATCH

Bait/sport flag
Species
Origin
Year, Month
Port Landed
Gear
Length (5-foot increments)
Number of tickets consolidated
Total dollar amount
Total catch in pounds
Transaction type
Arrival type

VESSEL

Fish & Game Number
Party Boat Flag
Vessel Name
Homeport
State Registration/Coast
Guard Number
Length
Beam
Gear, Principle type
Owner
Address
Season
Date of Issue

Vessel catch records are aggregated according to vessel length in 5-foot increments. The California Department of Fish and Game is therefore dealing with catch information by vessel size class, which is determined by vessel length. Because of the way data are summarized, there is no way to identify individual vessels.

Two Dispatchers Hired to Support PACES

The enforcement division of the California Department of Fish and Game (CDF&G) has hired two dispatchers, one in Long Beach and one in San Diego, to support the Southwest Region/CDF&G Pacific Area Cooperative Enforcement System

MISCELLANEOUS

PUBLIC AFFAIRS

Honolulu Laboratory

Fishery biologist Richard N. Uchida participated as a judge in the Hawaii State finals of the 25th Science and Engineering Fair held this month.

La Jolla Laboratory

On March 11, biological technician Ron C. Dotson presented a talk on longlining and sonic tracking to the San Diego Professional Mariners Association. Approximately 30 to 40 people attended the talk, which was well-received by the audience.

On March 16, fishery biologist Dr. Paul Smith presented a talk on "How many fish in a school" to a class of 20 students at The Bishop's School, La Jolla, California.

Tiburon Laboratory

This month computer specialist Nancy Wiley and fishery biologist Tina Echeverria participated in a career day seminar at Skyline Community College, San Bruno, California. Thirty professional women from education, industry, and government each met with up to 15 junior and senior high school girls to discuss careers for women in math and science. General discussion involved educational requirements for the various careers, a personal look at the participant's choice of a career, specific career profile, and how it affects their private lives.

SEMINARS

Honolulu Laboratory

- March 9 - Dr. Jacek Majkowski, Commonwealth Scientific and Industrial Research Organization (CSIRO), Cronulla, N.S.W., Australia, spoke on "The estimation of a catch level which stabilizes the parental biomass of an exploited fish stock."

La Jolla Laboratory

- March 2 - Dr. Jacek Majkowski, Commonwealth Scientific and Industrial Research Organization (CSIRO), Cronulla, N.S.W., Australia, presented a seminar on "The estimation of a catch level which stabilizes the parental biomass of an exploited fish stock."
- 16 - Sharon Lundin, Employee Services, NASO, presented briefings with the general staff to discuss the General Workforce Performance Appraisal System (GWPAS), the Merit Pay Performance Appraisal System, and the Office of Personnel Management review.
- Dr. John Graves, Post-Doctoral Research Associate, National Research Council, NOAA, Southwest Fisheries Center, spoke on "The application of electrophoretic techniques to fisheries biology."
- 18 - Dr. Maurice Stansby, Northwest and Alaska Fisheries Center, NMFS, Seattle, Washington, discussed "New findings on importance of fish consumption in respect to heart disease."
- 23 - Dr. Timothy Gerodette, Scripps Institution of Oceanography, gave a seminar on "Detecting trends in marine mammal populations."
- 25 - Dr. Dan Goodman, Montana State University - Scripps Institution of Oceanography, presented a seminar on "Biases in Chapman-Robson mortality estimates."
- 30 - Dr. John Graves, Post-Doctoral Research Associate, National Research Council, NOAA, Southwest Fisheries Center, gave a talk on "The role of enzyme variation in environmental adaptation."

Tiburon Laboratory

- March 12 - Dr. William Lenarz, Tiburon Laboratory, Southwest Fisheries Center, presented a talk on the widow rockfish fishery at the Northwest Trawl Conference and Gear Show, Coos Bay, Oregon.

TRAINING

La Jolla Laboratory

- January 5- - Robert Franco, Biological Technician - "Introduction to
March 9 Data Processing," La Jolla, California.
- March 10 - Emille Cole, Secretary - "Self-presentation for the
Professional Woman," Coronado, California.
- 29-31 - Benjamin Remington, Executive Officer - "Management
Institute," Los Angeles, California.

Tiburon Laboratory

- March 3-4 - Maureen Woods, Librarian - "OCLC for Reference and
Public Service," Stockton, California.

VISITORS

Honolulu Laboratory

- March 2 - Dr. Roy Tsuda, University of Guam Marine Laboratory,
visited Richard Shomura, Laboratory Director.
- 4 - Ambassador William Bodde, Jr., East-West Center
Diplomat-in-Residence, met with Richard Shomura to
discuss South Pacific fisheries.
- 5 - Rear Adm. Charles K. Townsend and Bob Hitz, Pacific
Marine Center, Seattle, Washington, and Lt. Cmdr.
Robert C. Roush, Commanding Officer, Townsend Cromwell,
met with Richard Shomura, Jeffrey Polovina, and William
G. Gilmartin.
- 5-10 - Dr. Jacek Majkowski, CSIRO, visited the Honolulu
Laboratory and toured the Laboratory's Kewalo Research
Facility and the Hawaii Institute of Marine Biology,
University of Hawaii.
- 11 - Syd Kraul and King Burch of the Waikiki Aquarium visited
Richard Shomura.
- 21 - Dr. Frank Williams of the University of Miami visited
the Laboratory.

- 25 - James H. Czerwonky from the Office of Policy and Planning, NMFS, Washington, D.C., visited Richard Shomura.

La Jolla Laboratory

- March 1 - Julio Cesar Salis Guervara, Laurdes Vasquez Yeomans, Eloy Sosa Cordero, Mauricio Giracdo, and Jorge Rodriquez, CICESE, Ensenada, Baja California, Mexico.
- 2 - Jacek Majkowski, CSIRO, Division of Fisheries Research, Cronulla, Australia.
- 4 - Robert Fletcher, San Diego Sportfishing Association, came to the Center to speak with Drs. Gary Sakagawa, Sam Herrick, and Norm Bartoo.
- 4-5 - Dr. Alexander Christakis, University of Virginia's Center for Interactive Management, met with Center Director Izadore Barrett, John Carr, and David Mackett at La Jolla.
- 16 - Jack T. Andrews, Southwest Region, NOAA, Terminal Island, California.
- 17 - R. Brede, SIMRAD, Horten, Norway.
- Laddie Martin, SIMRAD, La Jolla, California.
- 29 - William A. Sprigg, National Climate Program Office, NOAA, Rockville, Maryland.

Tiburon Laboratory

- March 11 - Dr. Izadore Barrett, Southwest Fisheries Center Director, La Jolla, California.
- Bruce Wyatt, Sea Grant Program, University of California, Davis.
- 12 - David Mackett, Southwest Fisheries Center, La Jolla, California.
- 19 - Gail Roper, Pacific Marine Fisheries, Petaluma, California.
- 30 - Thomas Cannon, Envirosphere Company, Concord, California.

MEETINGS AND TRAVEL

Honolulu Laboratory

- March 1 - Laboratory Director Richard Shomura participated in a University of Hawaii Sea Grant Advisory Committee meeting at the Honolulu Laboratory.
- 8 - Rear Adm. Charles K. Townsend, C.R. Hitz, Lt. Comdr. Roush, Lt. James D. Sarb, Lt. Dean Smehil, and Ens. Andrew J. Aldridge participated in the precruise meeting, TC-82-01, and attended a briefing on Honolulu Laboratory research activities presented by Laboratory Director Richard Shomura and program leaders.
- 10 - Richard Shomura, Dr. Jeffrey Polovina, and Richard Uchida attended a meeting of the Coordinating Council on Research-Northwestern Hawaiian Islands at the Honolulu Laboratory.
- 11 - Richard Uchida, in lieu of Laboratory Director Richard Shomura, attended a Hawaii legislative committee (House Finance Committee) hearing concerning a bill on ciguatera research at the State Capitol.
- 15-16 - Center Director Izadore Barrett and Laboratory Director Richard Shomura participated in a meeting of the Scientific and Statistical Committee, Western Pacific Regional Fishery Management Council at the Honolulu Laboratory.
- 17 - Sam Pooley convened a meeting of fishery economists at the Honolulu Laboratory.
- 18 - Richard Shomura and Mary Lynne Godfrey, Administrative Officer, attended a Federal Executive Board luncheon meeting in Honolulu.
- 19 - Laboratory Director Richard Shomura convened a meeting of ciguatera researchers to discuss the current status of Pacific ciguatera research. Participants from the Honolulu Laboratory included Shomura, Richard Uchida, William Gilmartin, Bernard M. Ito, Dr. Jerry Polovina, and Howard O. Yoshida.
- 22-23 - The Advisory Subpanel on Billfishes of the Western Pacific Regional Fishery Management Council met at the Honolulu Laboratory to discuss the billfish fishery management plan.

La Jolla Laboratory

- February 16- - Jane McMillan traveled to Terminal Island, California,
March 19 to assist in preparation of draft jack mackerel
preliminary management plan and regulatory analysis in
anticipation of joint venture applications.
- February 22- - Eric Lynn conducted an anchovy survey aboard the F/V
March 9 Oregon Beaver.
- March 1 - An EEO meeting was held at the Center.
- 1-5 - Dr. R. Michael Laurs, Ron Lynn, and Bob Nishimoto
traveled to Monterey, California, to consult with
scientists at the Pacific Environmental Group, SWFC,
concerning albacore research.
- 4-9 - Charles Oliver traveled to San Nicholas Island,
California, to assist in elephant seal studies.
- 5-8 - Dr. Doug DeMaster traveled to San Nicholas Island,
California, to tag elephant seal pups as part of
assessment-oriented research.
- 5-10 - Mark Lowry traveled to La Paz, Mexico, to participate
in annual marine mammal meetings.
- 6-12 - Dr. Reuben Lasker traveled to Baltimore, Maryland, to
attend an Ocean Color Instrument Working Group meeting
at NASA's Goddard Space Center and to New York to visit
the Osborne Marine Lab.
- 10 - A meeting was held at the Center to discuss the SWFC's
overall plan for dolphin research in 1982 and beyond.
- 10-12 - Charles Oliver traveled to San Clemente Island,
California, to continue studies on elephant seals.
- 11 - Center Director Izadore Barrett traveled to Tiburon,
California, to discuss administrative matters with the
Director and staff of SWFC's Tiburon Laboratory.
- 12 - Fred Kellenberger traveled to Terminal Island,
California, to attend a Fishery Information Network
(FIN) meeting.
- 14-20 - Dr. Mike Laurs traveled to Seattle, Washington, to meet
with scientists from NMFS' Northwest and Alaska
Fisheries Center to complete work plans for cooperative
satellite-oceanography work, and to Walla Walla,
Washington, to present a paper on the results of an

albacore tracking project at the Symposium on Biotelemetry and Radiotracking.

- 14-21 - Dr. Izadore Barrett, Center Director, traveled to Honolulu, Hawaii, to attend the Western Pacific Council's Scientific and Statistical Committee meeting.
- 15 - Dr. Rick Methot traveled to Long Beach, California, to meet with the Anchovy Advisory Subpanel and to present a proposed anchovy management plan amendment.
 - An EEO meeting was held at the Center.
 - A David Starr Jordan cruise debriefing was held at the Center.
- 15-17 - Dr. Tim Smith traveled to Washington, D.C. to attend a planning meeting on Antarctic treaty negotiations.
 - Dr. Daniel Huppert traveled to Portland, Oregon, to attend the Pacific Council's Scientific and Statistical Committee meeting.
- 17-19 - Charles Oliver continued studies on elephant seals at San Clemente Island, California.
- 22 - A CalCOFI meeting was held at the Center.
- 28-31 - Dr. Douglas DeMaster traveled to Portland, Oregon where he presented a paper at the North American Wildlife Conference/Special Session on Fishery/Marine Mammal Interactions, and then on to Astoria, Oregon, and Seattle, Washington.

Tiburon Laboratory

- March 3-4 - Sus Kato traveled to Ft. Bragg, California, to retrieve experimental octopus traps from a cooperating fisherman, and to discuss other plans and projects with fishermen and processors.
 - Laboratory Director Norman Abramson traveled to Fort Bragg, California, to interview California Department of Fish and Game personnel on sampling methods.
 - Maureen Woods traveled to Stockton, California, to attend a workshop on OCLC for reference and public service and one on basic MARC tagging.
- 10-12 - William Lenarz traveled to Coos Bay, Oregon, to attend the Oregon State University Groundfish Symposium, and

to Fort Bragg, Eureka, and Crescent City, California, to confer with California Department of Fish and Game personnel and fishing industry personnel.

- Ed Ueber traveled to Coos Bay, Oregon, where he presented a talk at the Western Trawl Conference.
- 15-18 - Norm Abramson, Laboratory Director, traveled to Portland, Oregon, to attend the Pacific Fisheries Management Council meeting.
- 18-19 - Sus Kato traveled to Monterey, California, to discuss plans for exporting underutilized species to Japan with a fish processor.
- 19-21 - Ed Ueber traveled to Santa Clara, California, at the request of some groundfish processors, to attend the California Seafood Institute meeting.
- 23 - Ed Ueber delivered shortbelly rockfish to a fish dealer in San Jose, California.



Members of the 1982 EEO Committee at the La Jolla Laboratory: (left to right) Jim Squire, Dave Mackett, John MacGregor, Larry Eber, and Nelson Ross. (Not pictured - Lorraine Zorich and Chairman Douglas DeMaster.)

PERSONNEL ACTIONS

Honolulu Laboratory

- March 1 - Alan K. H. Kam, Biological Technician (Wildlife) - Full-time, Temporary Appointment.
- 8 - Penelope D. Scoggins, Biological Technician (Wildlife) Full-time, Temporary Appointment.
- Randy F. Stark, Computer Programmer - Part-time, Temporary Appointment.
- 10 - Doris J. Alcorn, Wildlife Biologist - Full-time, Temporary Appointment.
- Sheridan H. Stone, Wildlife Biologist - Full-time, Temporary Appointment.
- 29 - Thea C. Johanos, Wildlife Biologist - Full-time, Temporary Appointment.

La Jolla Laboratory

- March 1 - Chrissy Blair, Clerk - Temporary, Part-time Appointment.
- 3 - Wes Parks, Fishery Biologist - Leave Without Pay.
- 7 - Emille Cole, Secretary - Promotion.
- 21 - Susan Iacometti, Computer Systems Programmer - Reassignment.

NEW ADDITION TO LA JOLLA LABORATORY STAFF



JAY BARLOW

In February Dr. Barlow joined the Marine Mammal Monitoring Program as an Operations Research Analyst. Part of his duties will be the analysis of biological data collected by tuna vessel observers for information on marine mammal mortality rates. Dr. Barlow received his Ph.D. from Scripps Institution of Oceanography, UCSD, where he conducted research on the dynamics of populations of guppies.

Tiburon Laboratory

- March 7 - Bruce McFarlane, Oceanographer - Promotion.
- 19 - Steven Pace, Biological Aid - Termination.
- 22 - Gary Combes, Biological Aid - Temporary 1-year
 Appointment.
- 23 - Daniel Howard, Biological Aid - Return to Duty.
- 29 - Catherine Checkly, Biological Aid - Temporary 1-year
 Appointment.

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